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THE AMERICAN MUSEUM JOURNAL



FROM MURAL PANEL IN THE NORTH PACIFIC HALL

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The American Museum Journal

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MARY CYNTHIA DICKERSON, *Editor*

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SCIENTIFIC PUBLICATIONS, 1910

The American Museum of Natural History

The scientific publications of the American Museum are issued in three series:

The *Bulletin* in which are published short articles embodying the results of the research work of the various departments of the Museum. These articles are less voluminous and of more general interest than those which appear in the *Memoirs*. The *Bulletin* was founded in 1881, and the number of volumes which have been issued is twenty-eight;

The *Memoirs* composed of special articles covering research requiring more exhaustive treatment. They have been published at irregular intervals since 1893. Ten complete volumes and parts of four others have been issued;

The *Anthropological Papers*, similar in character to the *Bulletin*, but devoted exclusively to the results of field work and other research conducted by the anthropological staff of the Museum. The publication of these papers was commenced in 1907, six volumes having been issued up to the present time.

The scientific publications for the year 1910 are as follows:

BULLETINS AND MEMOIRS

J. A. ALLEN, Editor

Bulletin XXVII The Orders of Mammals. By William K. Gregory. pp. 1-525, 32 text figures.

Bulletin XXVIII (Twenty-nine plates and 100 text figures)

Art. I — The Black Bear of Labrador. By J. A. Allen. pp. 1-6.

II — Mammals from the Athabaska-Mackenzie Region of Canada. By J. A. Allen. pp. 7-11.

III — Mammals from Palawan Island, Philippine Islands. By J. A. Allen. pp. 13-17.

IV — Description of a Skull and some Vertebrae of the Fossil Cetacean *Diochotichus vanbenedeni* from Santa Cruz, Patagonia. By Frederick W. True. pp. 19-32, pls. i-v.

V — On the Skull of *Aptenodus* and the Skeleton of a New Artiodactyl. By W. D. Matthew. pp. 33-42, pl. vi, 5 text figs.

VI — On the Osteology and Relationships of *Paramys*, and the Affinities of the Ischyromyidae. By W. D. Matthew. pp. 43-72, 19 text figs.

VII — On some Orthoptera from Porto Rico, Culebra and Vieques Islands. By James A. G. Rehn. pp. 73-77, 1 text fig.

VIII — Some Parasitic Hymenoptera from Vera Cruz, Mexico. By Charles T. Brues. pp. 79-85, 1 text fig.

IX — Additional Mammals from Nicaragua. By J. A. Allen. pp. 87-115.

- X — The North American Species of *Neuroterus* and their Galls. By William Beutenmüller. pp. 117-136, pls. viii-xiii.
- XI — The North American Species of *Aylax* and their Galls. By William Beutenmüller. pp. 137-144, pl. xiv.
- XII — Mammals from the Caura District of Venezuela, with Description of a New Species of *Chrotopterus*. By J. A. Allen. pp. 145-149.
- XIII — On the Genus *Presbytis* Esch., and 'Le Tarsier' Buffon, with Descriptions of Two New Species of *Tarsius*. By D. G. Elliot. pp. 151-154.
- XIV — A Note on *Siphostoma pelagicum* (Osbeck). By John Treadwell Nichols. pp. 155-157, 1 text fig.
- XV — A Note on the Identity of *Caranx forsteri* Cuvier and Valenciennes. By John Treadwell Nichols. p. 159.
- XVI — On Two New Blennys from Florida. By John Treadwell Nichols. p. 161.
- XVII — New or Little Known Reptiles and Amphibians from the Permian (?) of Texas. By E. C. Case, pp. 163-181, 10 text figs.
- XVIII — The Skeleton of *Pacilospondylus francisi*, a New Genus and Species of Pelycosauria. By E. C. Case. pp. 183-188, 3 text figs.
- XIX — Description of a Skeleton of *Dimetrodon incisivus* Cope. By E. C. Case. pp. 189-196, pls. xv-xix, 5 text figs.
- XX — A Comparison of the Permian Reptiles of North America with those of South Africa. By R. Broom. pp. 197-234, 20 text figs.
- XXI — Tertiary Faunal Horizons in the Wind River Basin, Wyoming, with Descriptions of New Eocene Mammals. By Walter Granger. pp. 235-252, pls. xx-xxiii, 6 text figs.
- XXII — The North American Species of *Aulacidea* and Their Galls. By William Beutenmüller. pp. 253-258, pls. xxiv-xxvi.
- XXIII — Three New Genera of Myrmicine Ants from Tropical America. By William Morton Wheeler. pp. 259-265, 3 text figs.
- XXIV — The Cretaceous Ojo Alamo Beds of New Mexico with Description of the New Dinosaur Genus *Kritosaurus*. By Barnum Brown. pp. 267-274, pls. xxvii-xxix, 7 text figs.
- XXV — Fossil Insects and a Crustacean from Florissant, Colorado. By T. D. A. Cockerell. pp. 275-288, 4 text figs.
- XXVI — The Phylogeny of the Felidæ. By W. D. Matthew. pp. 289-316, 15 text figs.
- XXVII — Collation of Brisson's Genera of Birds with those of Linnaeus. By J. A. Allen. pp. 317-335.
- XXVIII — Observations on the Habits and Distribution of Certain Fishes taken on the Coast of North Carolina. By Russell J. Coles, pp. 337-348.

Memoir XII (Jesup North Pacific Expedition, Vol. VIII)

Part I — Chukchee Mythology. By Waldemar Bogoras. pp. 1-197.

Memoir XIII (Jesup North Pacific Expedition, Vol. IX)

Part I — The Yukaghir and the Yukaghirized Tungus. By Waldemar Jochelson. pp. 1-133, pls. i-vii, 1 map.

ANTHROPOLOGICAL PAPERS

CLARK WISSLER, Editor

Vol. IV. Part II — Notes Concerning New Collections. (Edited by Robert H. Lowie.) pp. 271-337, pls. iv-viii, 42 text figs.

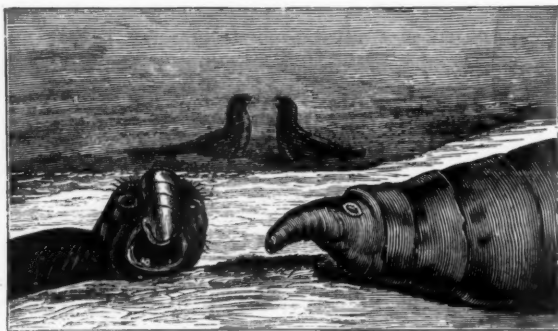
Vol. V. Part I — The Material Culture of the Blackfoot Indians. By Clark Wissler. pp. 1-176, pls. i-viii, 103 text figs.

Part II — Contribution to the Anthropology of Central and Smith Sound Eskimo. By Aleš Hrdlička. pp. 177-280, pls. xi-xxiii.

Vol. VI. Part I — The Archaeology of the Yakima Valley. By Harlan I. Smith. pp. 1-171, pls. i-xvi, 129 text figs.

Part II — The Prehistoric Ethnology of a Kentucky Site. By Harlan I. Smith. pp. 173-241, pls. xvii-lxiv, 1 text fig.

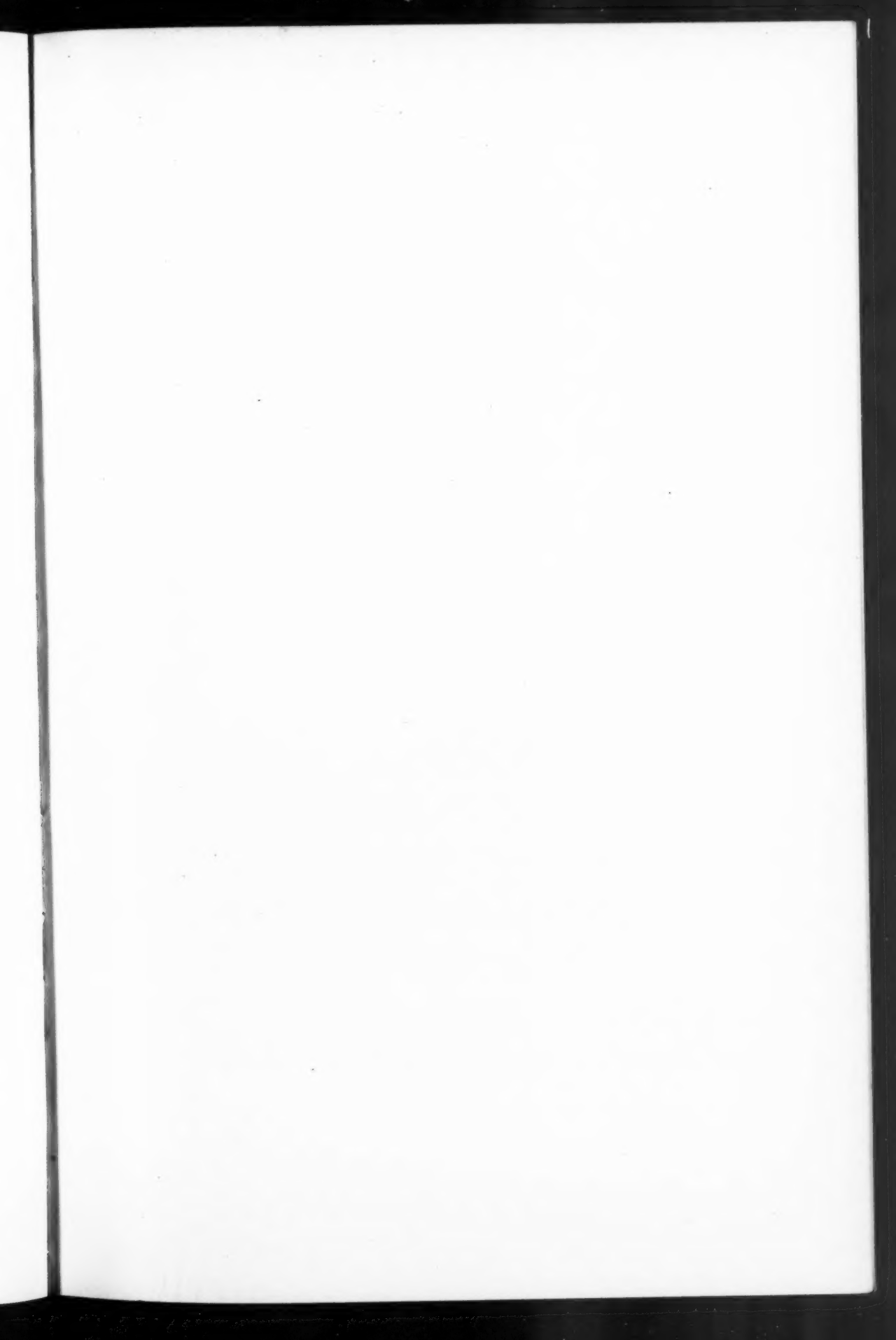
Other publications issued by the Museum are the *American Museum Journal* and the *Guide Leaflets*. All the above publications with the exception of the *Memoirs*, vols. VIII to XIV inclusive may be purchased from the Librarian of the Museum. Vols. VIII to XIV of the *Memoirs* are published by E. J. Brill, Leiden, Holland, and may be obtained through G. E. Stechert, Bookseller, 129 West 20th Street, New York City.

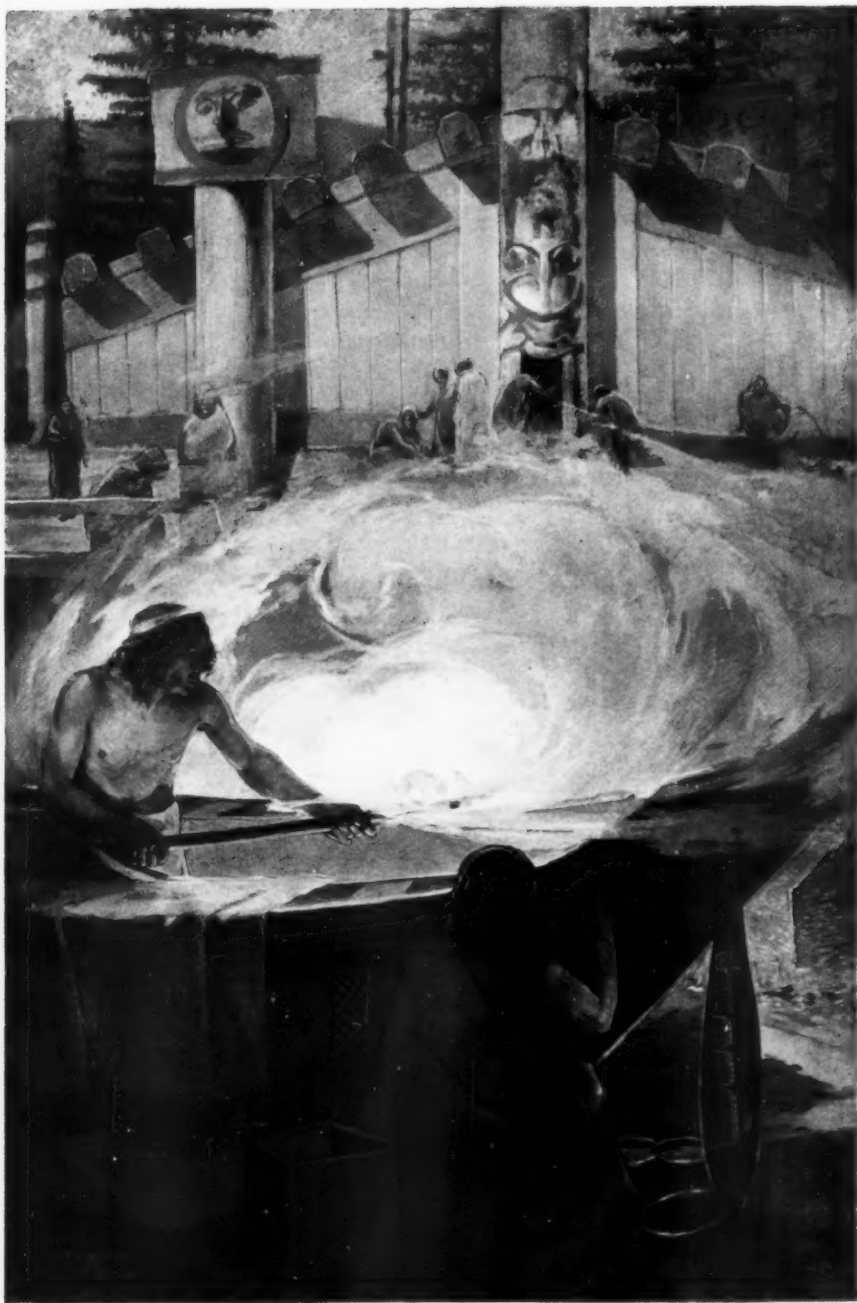


After Peron et Leseur. Paris, 1807

"SEA ELEPHANTS"

Comparison of this cut with the reproductions of photographs on pages 110 and 111 suggests something of the advance in accuracy zoological illustrative work has made in the past one hundred years





From mural panel, "The Canoe Builders," by Will S. Taylor

THE STEAMING AND DECORATION OF A HAIDA CANOE

—"The New Mural Decorations," page 129

The American Museum Journal

VOL. XI

APRIL, 1911

No. 4.

RARE ELEPHANT SEALS FOR THE MUSEUM

REMINDEES OF AN EXTINCT MULTITUDE, A LOST INDUSTRY AND A LOST WEALTH
WHICH ARGUE FOR ADOPTION OF THE PRINCIPLE OF CONSERVATION

ON February 25 the Government steamer Albatross carrying an expedition commanded by Dr. Charles H. Townsend sailed from San Diego for work in deep sea dredging and for a scientific investigation of Guadalupe Island, which lies some two hundred and fifty miles off the coast south of San Diego. On March 6 the vessel was again in port at San Diego to send to the East news of the expedition's success, and certain valuable freight, as told in the following extract from Dr. Townsend's letter:

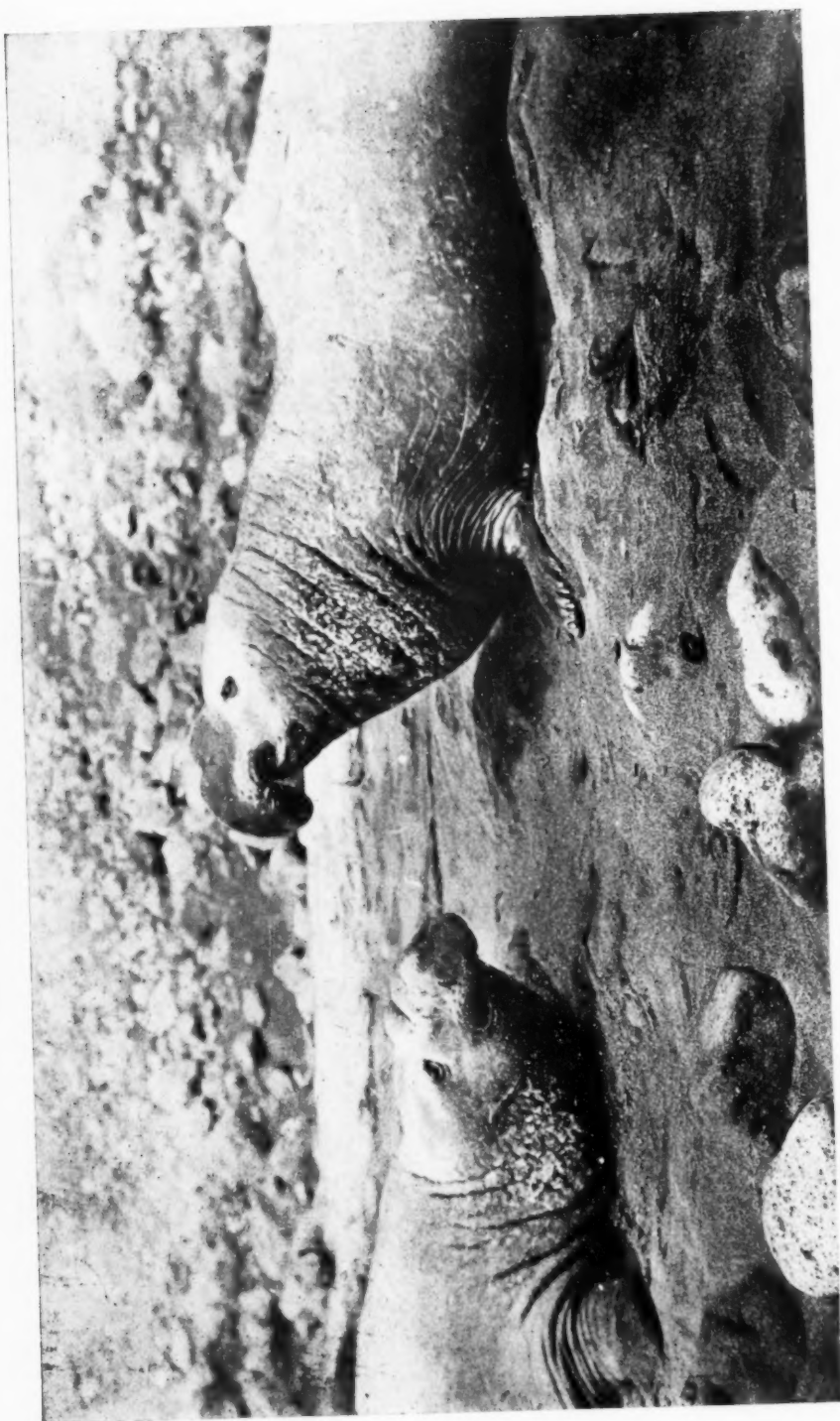
Our success at Guadalupe Island was quite beyond expectation. In addition to work on the birds and plants and various land collections of the island, we captured alive six sea elephants for the New York Aquarium and the Zoological Park and succeeded in getting four skins and two skeletons of adult sea elephants for the American Museum.

The three old males were monsters sixteen feet long, with proboscis as long as the head. We have one skull two feet long. We wound up the young seals in nets so tightly that we could handle them like bales. The skins of the old bulls were very heavy; each one flensed and salted was packed in a full-sized barrel which it completely fills and that without the skull.

When all was packed and ready, then the work really began, for we had to get our loads through a heavy surf to the ship. A single specimen made a load and the ship lay more than a mile away. We had four "upsets" but lost nothing. The series of photographs which we obtained are the only ones of the species in existence, and there are none published of the Antarctic species that show large males.

The ship is taking on coal and we are off to-morrow [to Cedros Island]. We came back only on account of the six young sea elephants. The six cases of live seals go by express; the seven barrels of skins and skeletons we are sending by freight.

The elephant seal is a "true" seal (*Phocidæ*), although in breeding habits and in the fact that the males greatly exceed the females in size, it resembles the sea lion and the fur seal as well as the walrus. There are two species, a southern (*Macrorhinus leoninus*) not found north of 35° south latitude and a northern (*M. angustirostris*) not found south of 24° north latitude. The two forms differ little in habits or in external features, the classification being based on skull structure. The long isolation of the northern and southern forms would make them valuable for the study of



Photograph by C. H. Towns

ELEPHANT SEALS OR "SEA ELEPHANTS" ON GUADALUPE ISLAND (ADULT MALES)

Largest of all Pinnipeds, not excepting the walrus; maximum length of male 22 feet, female much smaller (as among eared seals). or "trunk" has the nostril openings at the end and can be expanded and erected at will. Females and immature seals lack a proboscis



Photograph by C. H. Townsend.

With proboscis erected, and mouth opened, revealing formidable teeth, the sea elephant sends forth guttural roars which carry for a considerable distance



Photograph by C. H. Townsend

The male sea elephants fight desperately — “beach-masters” the sealers in the Antarctic called them — and their necks and breasts bear evidence of many encounters

geographical distribution and its effects on species formation, if sufficient material could be brought together for the work; but sea elephants were nearly exterminated before exhaustive museum collections were made, so that specimens are now rare. The American Museum prior to 1911 had in its relatively large collection representative of the seals no single example of this species, but at just this time when word of the new material comes from the Pacific, the institution has gained possession of two skulls from Kerguelen Island in the Antarctic.¹

No better instance than the elephant seal can be given of the extermination of a species through the wastefulness and commercial greed of man, making clear the necessity of conservation as a principle directing human action. The elephant seal, unlike the fur seal, has a deep layer of blubber, sometimes six or seven inches thick, and the oil is superior even to whale oil. Elephant seals existed in vast numbers one hundred or more years ago and might still have been yielding a profitable industry. One has only to read the vivid descriptions by Captain Scammon, 1874, and by H. N. Moseley, Member of the Scientific Staff of the Challenger, 1879, to realize that here existed great wealth. Captain Scammon says of Heard's Island, "There were remains of thousands of skeletons. Bones lay in curved lines like long tide lines on either side of the plain above the beaches marking the rookeries of old time and tracks of the slaughter of the sealers."

The case is only several stages advanced beyond that of the fur seal. With the latter there is still the chance to handle the herds in a restricted industry and thus husband them until they can yield a larger industry without fear of loss of the species. Such must be in future the order for all industries dependent on wild animal life. For man has upon him at last the responsibility of knowledge, not only of the limitations of that life but also of the relative rapidity with which a species succumbs. By conservation, the era of strict economy in this line, as in others, will be delayed for coming generations, if not averted. Some species now approaching extinction can be restored through legislative protection and artificial breeding, some not yet endangered can be transplanted from continent to continent and domesticated; but no conservation is likely ever to make up for losses which have come through the actual extermination of whole races of animals of economic value. The elephant seal is only one of the many examples of extinct or nearly extinct fur-bearing or oil-producing animals or those of high food value, but it stands recorded in the world's history a scathing comment on the status of man's knowledge and of the development of his ethical sense in the nineteenth century.

M. C. D.

¹ Through the efforts of Mr. Frank K. Wood of New Bedford, Massachusetts.

THE GROUND SLOTH GROUP

By W. D. Matthew

N EARLY two centuries ago a Spanish colonist in the Viceroyalty of Buenos Aires, now the Argentine Republic, discovered the skeleton of a huge animal *muy corpulente y raro* in the River Luján, a few miles from the city. The skeleton was sent to Madrid, where it was finally mounted and is still preserved in the Royal Museum.

This was the first fossil skeleton ever mounted. It was recognized by the finder as unlike that of any animal of his acquaintance. But it was the great Cuvier who recognized its relationship to the tree sloths and other animals of the Edentate order, and named it the *Megatherium*. Subsequently, in 1833, Charles Darwin on his voyage in the Beagle, visited the Argentine coasts and brought away various remains of this and other extinct animals, and between 1845 and 1860 several more or less complete skeletons of the *Megatherium* and other huge "ground sloths," as they came to be called, were sent to England and were studied and described by the great anatomist Richard Owen.

Since that time numerous fine skeletons of these animals have been disinterred from the vast loess or loam deposit which underlies the Pampas of the Argentine and is known as the Pampean formation. They are preserved in various European and American museums, and a splendid series of them is the pride of the two great museums of Argentina, the Museo Nacional and Museo de La Plata.

A fine collection of these and other extinct mammals of South America, made by Señors Ameghino, Larroque and Brachet, was exhibited at the Paris Exposition of 1878 and passed into the possession of the late Professor Cope. It was purchased for the American Museum in 1900 by a



THE GROUND SLOTH GROUP

This group was completed in February, 1911, and installed in the new Quaternary Hall of the American Museum

number of the Trustees of this Museum, and its principal specimens are or will be exhibited in the South American section of the new Quaternary Hall.

The center-piece of this exhibit is the new Ground Sloth Group, just completed. It consists of four original skeletons representing two genera of these animals, *Lestodon* and *Myiodon*. The largest skeleton, *Lestodon armatus*, ranks next to the *Megatherium* in size, but differs in various particulars, especially in the shape of the head, characters of the teeth and number of claws on the feet. The three smaller skeletons belong to two species of *Myiodon*, *M. robustus* and *M. (Pseudolestodon) myioides*.

The skeletons are grouped around a tree trunk, in poses indicating the supposed habits and adaptation of the living animals. The *Lestodon*, standing on his hind legs, is endeavoring to reach up and drag down branches of the tree. One of the *Myiodons* is busily digging and tearing at the roots to loosen and break them and so help his big friend to uproot and pull the tree down. A third animal is coming around the base of the tree to assist in the digging operations, while a fourth stands at a short distance, ready to add his weight to drag down the branches when they are brought within reach.

These poses illustrate the theory of the habits of the ground sloth deduced by Owen from the study of the skeletons—a model of scientific reasoning whose accuracy has never been impugned. Among the earlier students of this animal, the cautious Cuvier had contented himself with observing that the great clawed feet indicated that it was more or less given to digging in the ground. Some of his learned contemporaries were bolder in their speculations. Pander and D'Alton regarded it as an "enormous earth-mole which obtained its nourishment beneath the earth's surface through continuous exertion of its colossal strength; and when, perhaps by sinking of the ground to the sea-level, it was driven to live on the surface of the earth, its vast powers, lacking exercise, degenerated, and its size dwindled, until finally it became the weak and puny tree sloth of to-day."¹

Lund at a somewhat later period, held a view scarcely less fanciful. He believed that the *Megatherium* was arboreal, like the modern sloth, and observes: "In truth, what ideas must we form of a scale of creation where instead of our squirrels, creatures of the size and bulk of the Rhinoceros and Hippopotamus climbed up trees. It is very certain that the forests in which these huge monsters gambolled could not be such as now clothe the Brazilian mountains, but it will be remembered... that the trees we now see in this region are but the dwarfish descendants of loftier and nobler forests... and we may be permitted to suppose that the

¹ Translated and condensed from Pander and D'Alton's *Das Riesen Faul-Thier*, 1821, p. 16.





By courtesy of the New York Zoological Society

THE MODERN TREE SLOTH

This is the nearest living relative of the ground sloths

vegetation of that primeval age was on a no less gigantic scale than the animal creation."¹

Owen very properly ridiculed these fanciful theories. In point of fact, the mere size of the animal would render either of these modes of life impossible so long as the laws of physics and mechanics hold true. The mode of life which is practicable to a mole or a squirrel is an utter physical

¹ Translated in Owen 1842, "Description of the Skeleton of an Extinct Gigantic Sloth."

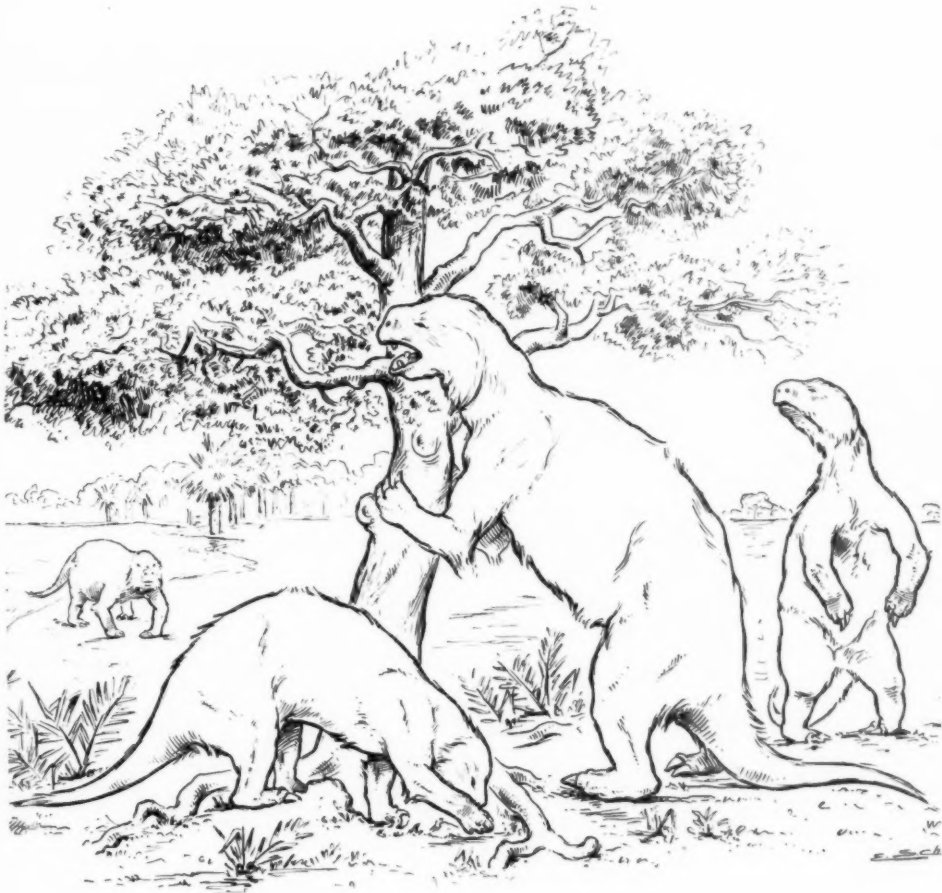
impossibility to an animal the size of the *Megatherium*. It could not have been other than terrestrial or aquatic, and of the latter mode of life there is no indication in its structure.

In his brilliant and masterly argument the great English anatomist showed how the teeth were adapted to the bruising and crushing of leaves and twigs, how the structure of the jaws and skull and arrangement of the nerve channels indicated loose, flexible lips and long prehensile tongue adapted to browsing; how the long loose-jointed forelimbs would enable it to lay hold of branches or small trees and drag them down within reach; how the powerful claws would enable it to dig around the roots of larger trees and loosen them, and the massive hind quarters and tail would give the necessary weight and fulcrum to pull down these trees when loosened in order to feed upon the upper foliage thus brought within its reach. In incidental support of this theory, he pointed to the frequent occurrence of fractures in the massive, heavy bones of limbs and skull. One of the skeletons in this group has a naturally healed fracture of the bones of the hind leg very likely due to a tree falling upon it in the course of its lumbering operations — lumbering, perhaps, in more senses than one.

Such is the theory of the habits of life of the ground sloths, which this group is designed to illustrate. As to their appearance, we know from recent discoveries that the *Mylodons* were covered with a thick coat of furry hair, somewhat like the brown bears of Alaska. A large piece of the hide found in a cavern at Last Hope Inlet, Patagonia, is preserved in the British Museum. It is of a golden brown color, and the thick skin, in which are buried numerous small nodules of bone, made an effective defense against cold, the assaults of nearly all beasts of prey, and most of the bumps and bruises incidental to its mode of life. The one carnivorous enemy the *Mylodon* might have cause to fear would be the great sabre-tooth tiger, *Smilodon*, whose huge compressed canine tusks and powerful organization were adapted to prey upon the great thick-skinned ground sloths and other large herbivora.

The Ground Sloth Group is the most realistic that has yet been attempted in the mounting of fossil skeletons, and the method of mounting, eliminating the upright steel rods ordinarily used, adds much to its effectiveness. This method, devised in 1904 by Albert Thomson of this department, is here applied for the first time by Head Preparator Hermann to the mounting of large skeletons. The group was designed by Erwin Christman and a small working model made. The parts of the skeleton in the model are easily adjustable, and the poses were criticised and discussed in comparison with the unmounted skeletons by Professor Osborn and the scientific staff until an adjustment was reached which seemed to represent the most

characteristic poses and the habits of these animals. The original skeletons were then mounted by Charles Lang under direction of Mr. Hermann, their missing bones and processes having first been restored by Charles and Otto Falkenbach.



SKETCH RESTORATION OF THE GROUND SLOTH GROUP BY ERWIN CHRISTMAN, 1911



Photo by Dwight Franklin

One may seize a five-foot paddlefish by the "nose" or the tail and haul it into the boat



Photo by Dwight Franklin

THE DAY'S CATCH

THE SPOONBILL FISHERY OF THE LOWER MISSISSIPPI

By Louis Hussakof

LAST spring the Museum sent an expedition to the State of Mississippi to collect material for an exhibition group of the paddlefish or spoonbill-cat. This is one of the most singular fishes found in American waters. The name paddlefish is given it in allusion to the extraordinary, long, paddle-shaped jaw or "nose." It is a large fish, often reaching a length of six feet and a weight of one hundred and sixty pounds. It is found only in the water-ways of the Mississippi valley, ranging as far north as the Great Lakes.

From the name spoonbill-cat by which it is often known, one might think it a catfish; but it is not a catfish. It is a ganoid, or a member of that ancient group of fishes which includes the sturgeon and a few other

forms. In earlier geologic times ganoids were the dominant race of fish, at one period of their evolution even outnumbering all the other kinds of fish put together. But they have since then fallen upon evil times, and are now reduced to only a few genera, which play but an insignificant rôle in the fish-life of to-day.

The paddlefish reaches its largest size and is found in greatest abundance in the smaller lakes connected with the lower Mississippi; and it was at one of these lakes — Moon Lake, in Coahoma County, Mississippi — that material was sought. Here Mr. I. E. McGehee carries on an extensive spoonbill fishery, and through his courtesy, admirable collecting facilities, including the use of his fishing paraphernalia, were obtained. The Museum party consisted of Mr. Dwight Franklin of the Department of Preparation of the Museum, and the writer; the expenses of the work were defrayed by the Dodge Fund.

Until about a decade ago the spoonbill was of little economic value; it was interesting merely as a zoölogical curiosity. About that time however, the fact was discovered that when smoked it makes a tolerable substitute for smoked sturgeon and that its roe makes excellent caviar. Since then spoonbill fisheries have sprung up at various points on the Mississippi and Ohio rivers.

The fish is usually taken in a seine. A practical method of operating a large seine has been introduced by Mr. McGehee at Moon Lake and is worth noting. The seine is wound on a huge spool-shaped reel which is mounted in a flat-bottomed boat. It is laid by unrolling this reel; and it is wound up by having the crew walk up the spokes of the wheels as on a ladder, so that the reel is made to revolve. As the seine is gradually wound up and the fish are confined to narrower and narrower space, they dart wildly about seeking means of escape. One may then study the paddlefish at close range. It is an exceedingly clumsy creature, hardly making an effort to escape capture. Its sense of sight is poorly developed, as indeed one might infer from its small beady black eyes. If its "nose" is caught in the seine it makes only feeble efforts to free itself, and usually fails in doing so. The contrast between the clumsiness of the spoonbill and the alertness of an active fish, is strikingly brought out if any garpike are in the haul; for the gar makes tremendous efforts to escape and unless rendered unconscious by a blow with a mallet, will flash through the seine as if it were gauze. Leaning over the side of the boat, near the cork-line of the seine, one may seize a five-foot paddlefish by the "nose" or the tail and haul it into the boat; the only resistance is that of weight. The fish has absolutely no sport value. The number of spoonbill taken in a single haul varies; sometimes only a few are brought up, and sometimes



Photo by Dwight Franklin

Seining for spoonbill on Moon Lake, Mississippi



Photo by L. Hussakof

The crew walk up the spokes of the wheels as on a ladder thus causing the reel to revolve and wind up the seine



Photo by L. Hussakof

Of course other fish are caught, such as bass, carp, crappie and drum; but they are of secondary importance and the game fish taken are thrown back

as many as a hundred. Of course other fish are caught, such as bass, carp, crappie, and drum; but they are of secondary importance and the game fish thus taken are thrown back as they are safeguarded for the angler by state law.

The paddlefish are cut up in the manner shown in the photograph. Their heads and fins are usually discarded, but sometimes they are boiled for their oil. The roe is then removed to be prepared into caviar. It

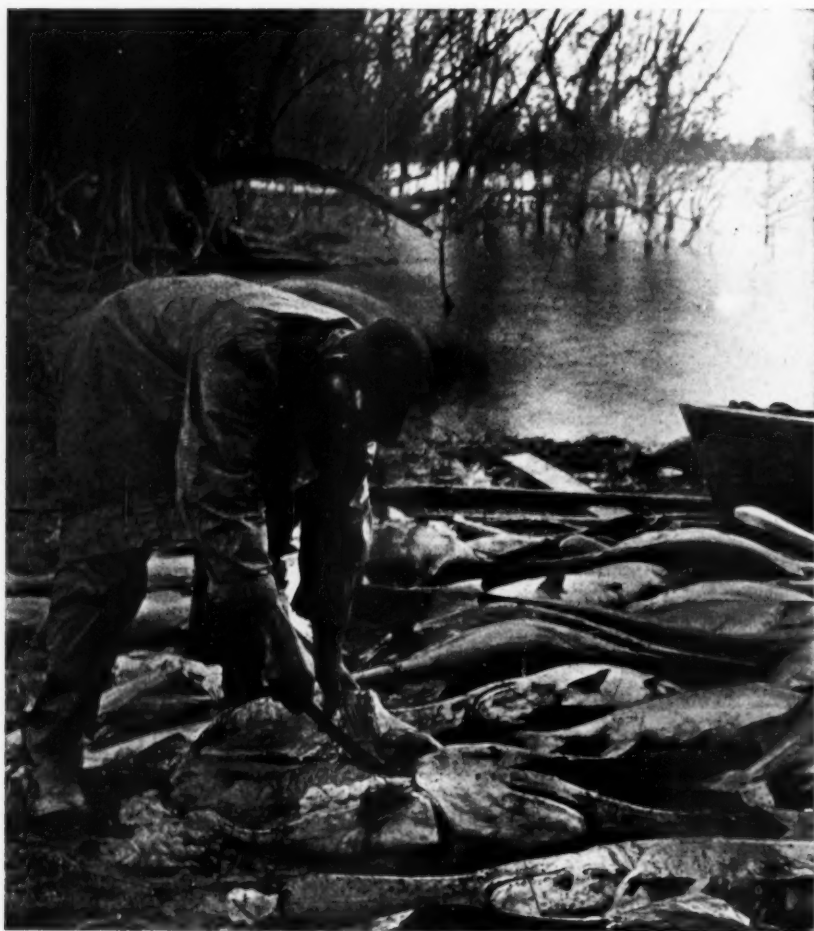


Photo by L. Hussakof

Removing the roe for the preparation of caviar. The roe weighs from two to fifteen or twenty pounds in a single fish. The heads and fins are usually discarded but sometimes they are boiled for their oil. The body of the fish is smoked and becomes "sturgeon"



Photo by Dwight Franklin

Preparing spoonbill caviar. The roe is put on a coarse wire sieve and rubbed by hand across the wires until the eggs are separated from their membranes and drop into the pan beneath

are separated from their membranes and drop into the pan beneath the sieve. The raw caviar is mixed with "German" salt and is ready for shipment. It must undergo still further preparation however, before it is in the form familiar to us. In its raw state it brings about half-a-dollar a pound. It is said that spoonbill caviar is the best known, having received the highest award at one of the World Expositions.

weighs from two to fifteen or twenty pounds, in a single fish. It is put on a coarse wire sieve and rubbed by hand across the wires until the eggs



Photo by L. Hussakof

The spoonbill or paddlefish (*Polyodon spathula*)

RESEARCH AND EXPLORATION AMONG THE INDIANS OF THE NORTHERN PLAINS

By Clark Wissler

DURING the summer of 1910 the research staff of the Department of Anthropology made further progress on the systematic survey of the Northern Plains Tribes, returning collections from the Crow, Dakota and Village Indians. In central North America there is a large area drained by the Upper Missouri and Saskatchewan rivers, grass-covered land for the most part, the home of a number of Indian tribes of peculiar interest to anthropologists. Here in buffalo days lived eleven different tribes,—the Sarci, Blackfoot, Gros Ventre, Assiniboine, Crow, Dakota, Plains Cree, Plains Ojibwa, Hidatsa, Arikara and Mandan. Each occupied a more or less definite territory, and spoke a distinct language, generally recognized as belonging to one of four widely distributed linguistic families, Algonkin, Siouan, Athapascan and Caddoan. At present representatives of these aboriginal tribes survive on reservations in various parts of the area. The cultures of this group of northern Plains Indians, as presented in museum collections, show striking fundamental similarities in contrast to diverse linguistic origin and offer therefore an inviting field for museum collecting and investigation.

In 1906 the Department of Anthropology selected this area for continuous systematic exploration, to seek data for formulating the manner in which special ceremonies like the sun dance and the medicine pipe, as well as distinctive traits of material culture and art, were distributed throughout the region, one of the more important groups of problems now confronting serious students of American anthropology. Fortunately for this plan, the tribes concerned were neither closely confined nor forced to abandon their aboriginal economic life until after 1865, the change being gradual and continuous to the present day so that the domestic life and other aspects of culture, while much modified, are still cherished in the memories of old Indians from whom data and specimens may yet be obtained. Naturally with each succeeding year comes the obliteration of more and more of these precious memories, rendering the labors of our field workers less and less productive. The realization of this has led to the vigorous prosecution of the work by our field staff to the extent of available funds.

Field exploration has been conducted among practically the full list of tribes contemplated in the plan, the Sarci, Blackfoot, Assiniboine, Nez Perce, Northern Shoshone, Crow, Teton-Dakota, Hidatsa, Arikara, Mandan, Plains Cree and Plains Ojibwa. In most cases however, the work is still

far from complete and some important divisions of several tribes have not yet been visited. In every case more than a beginning has been made while in several instances the data accumulated are quite sufficient for the detailed study of the area necessary to the development of anthropology in America.

Regarding publications of results of this exploration, the following series has been issued: *Some Protective Designs of the Dakota, Gros Ventre Myths, Ethnology of the Gros Ventre, Mythology of the Blackfoot Indians, Mythology of the Northern Shoshone, Mythology of the Assiniboine, and Material Culture of the Blackfoot Indians*. In addition to these seven papers the following will appear in due time: *Social and Ceremonial Culture of the Blackfoot, Ethnology of the Crow, Ethnology of the Teton-Dakota, the Hidatsa and the Sarsi*. Other papers will appear as soon as the field work is sufficiently advanced. No other institution has given much attention to this area and while the older historical literature contains much valuable data of a desultory character, the only other specific publications not found in our series are a few minor studies on the Crow, Blackfoot, Hidatsa and Dakota, none of which are sufficiently comprehensive for a serious comparative study of the area as a whole. The field work has been conducted by the staff of the Department of Anthropology, Messrs. Clark Wissler, P. E. Goddard, Robert H. Lowie, Herbert J. Spinden and Alanson Skinner, also by Dr. J. R. Walker and Rev. Gilbert L. Wilson, not connected directly with the Museum.

Supplementary to this plan, Mr. Harlan I. Smith conceived and developed a plan for the archaeological survey of the Upper Missouri basin. The part of this area falling within the state limits of Wyoming and Montana is practically unknown to archaeology. Mr. Smith's explorations have so far been confined to eastern Wyoming, the results of which will be presented in a future publication. This work enjoying not only priority, but being conducted in a systematic manner will be an important contribution to our knowledge of the area and, it is hoped, will afford some basis for a conclusion as to the early inhabitants of the region, a matter of no small importance in the general comparative results of the ethnological survey now nearing completion.

Museum anthropology is confined to the aspects of culture represented by collections. Our collectors have met with favorable conditions so that their returns, supplemented by gifts from private collectors and patrons, give a fair start toward an efficient study series for the area as a whole. The Department has developed plans for an entire exhibition hall in which the general aspects of culture so far discovered in the area may be presented, showing with some detail the peculiarities in distribution for the distinctive traits.



Mural panel by Will S. Taylor

A TSMISHIAN FAMILY MAKING EULACHON "BUTTER"

The glow of the ember fire is on the girl's face as she waits for stones to heat. In the box at the right, fish are being boiled by means of the heated stones; the oil thus removed from the fish forms "butter." The residue is being strained by the woman at the left. The artist has used the medium of steam here and in the "Canoe Builders" to distribute the color effect of the fire

FOREWORD ON THE NEW MURAL PAINTINGS IN THE AMERICAN MUSEUM

THE first large commission for mural decoration in this country was given for Trinity Church, Boston. That was in 1870 and the artist was John La Farge, working in coöperation with H. H. Richardson, architect. Since that time and particularly in the past ten years there has been great advance in mural painting in America. Great public buildings are no longer built for utility only, but are given beauty and a character fitting their purpose by the coöperation of the artist with the architect. In a Museum, as a public building which entertains and educates the million or more people who visit it annually, there is opportunity for a high standard in the architecture and decoration of its halls, harmonizing design and color with the spirit as well as with the details of each accompanying exhibit. In this, mural decoration is fitted to play a large part, for the mural painting can often perform forcefully and with an effect of beauty what can be accomplished in no other way: it can vitalize an exhibit by setting forth the life and the country that the exhibit represents.

In the summer and fall of 1909 the American Museum sent an expedition to the North Pacific Coast, with Mr. Harlan I. Smith, ethnologist in charge, and Mr. Will S. Taylor, artist. On this expedition Mr. Taylor made studies for a series of mural panels to represent the North Pacific Indians as they were one hundred years ago when uninfluenced by white men. Sketches of landscapes were obtained, color notes on the different tribes and many photographs. Most of the old industries had disappeared however — as had also the old costumes — so that with all effort these mural paintings have had to be largely restorations. This has entailed tedious study of museum material and the literature of the subject on the part of the artist since his return. His study has been rewarded however; the ethnological staff of the Museum and Lieutenant Emmons, who has generously helped in the work of scientific supervision, pronounce these paintings rarely accurate presentations. Landscapes although idealized give the color and feeling of particular spots which a visitor to this northern country can locate, while each canvas shows good type portraits of the tribe represented.

The four panels from north to south in the Hall are in series, with color graded from the cool country of the northern part of the coast to the warmer country toward the south, and with design regulated in rhythmic sequence as in a mural frieze. The composition in each panel is simple and the action is readily understood. There is an evident center of interest and

the lines of the various figures, of mountain gorges, of masses of steam, of clouds, of tree branches either lead toward this center or serve to tie in the composition. Dignity appropriate to the subjects has been gained by a conspicuous introduction of vertical lines—a thin column of smoke, trees, totem poles, erect figures. Steam has been cleverly used in two of the pictures as a medium for the distribution of the color effect of fire.

Mr. Taylor considers himself fortunate in the position of the paintings in this Hall among old weathered totem poles, canoes and other symbols of Indian art. It has allowed him to portray the simple out-of-door life of the people with true local color and in a broadly decorative way unhampered by the usual modern architecture and ornament. The panels certainly meet the requirements of true decorations as well as serve their scientific purpose. They blend with their surroundings, an integral part of the color scheme of the Hall; they are flat in effect, clinging to the wall like tapestries though with relief high enough to give an effect of reality to the scenes and of increased space to the Hall.

The imagination sees also in these paintings something beyond the industry represented, something more than satisfying design and color. One finds himself picking out the various items that signify a development of love of beauty in this primitive race; speculating on the fact that the grandeur of this country has its concomitant in the earnestness of its people; and seeing in the pose and expression of certain of the figures evidence that mind and spirit, here as in all primitive races, have developed with the training of eye and hand. It is thus that Mr. Taylor's work done with high seriousness of aim meets the final demand of mural decoration.

M. C. D.

THE NEW MURAL PAINTINGS AND THE INDUSTRIES THEY PORTRAY

By E. C. B. Fassett

THE first four of a series of mural decorations by Mr. Will S. Taylor are completed and in their places in the Hall of the North Pacific Coast Indians. They invest this Hall with atmosphere and local color. They hang like tapestries between the weathered totem poles and dealing with themes of industry, combine truthful illustration with landscapes that would seem to be purely ideal. Here are mountains forested with hemlock and cedar. Yonder are glimpses of blue glaciers and veils of mist that suggest the cool atmosphere of the northern summer. In Mr. Taylor's sea-girt, mountain-sheltered scenes we behold the homes of the

weavers, carvers, basket makers and canoe builders whose works are gathered together in this Hall of the North Pacific Coast peoples.

The arrangement of the Hall is planned in such a manner that the materials are divided into seven arbitrary groups representative of the various tribes from the Columbia River to Mount McKinley. The Tlingit materials from the coast of Alaska occupy a space near the northern end, one section illustrating the material industries, another the social affairs and ceremonies. The collection from the Haida people who occupy the country immediately south of the Tlingit, including the Queen Charlotte's Islands, follow and are arranged similarly. In like manner succeed the exhibits of the Tsimshian, Bella Coola, Kwakiutl, Nootka and the southern coast Salish peoples; while the new mural decorations are so placed that those opposite each exhibit represent the general characteristics of the country from which the Museum collections came.

THE FIRST PAINTING

The Blanket Weavers

The first of Mr. Taylor's series of mural paintings is placed on the west wall of the space occupied by the Tlingit collections. He has chosen for the subject of this decoration the rapidly disappearing art of the Chilkat blanket maker. The origin of this type of wool weaving is attributed to



As many as possible of the sketches were made in sunlight in order better to reduce out-of-door effects when painting the decorations later



On the Stikine River at the Great Glacier. The artist visited all the country along the coast making color studies and collecting facts

the Tsimshian; but the art passed from them through the Tongas, the Stikine and the more southern Tlingit to the Chilkat tribe, a division of the Tlingit family which lives about the head of Lynn Canal in southeastern Alaska. This migration of art is attributable to the intermigratory habits of the people. Canoe life in the network of island channel-ways permits free intercourse between the tribes and an exchange of commodities which, together with the practice of intertribal marriages, accounts for the dissemination and perpetuation of similar arts among neighboring peoples.

The Chilkat blanket is undoubtedly the best possible expression for this group, not only that it is the emblem of the clan but also, as is always true of art objects, that it sums within its textile limits suggestions of the mythical lore and history of its people. Not least interesting is the fact that this textile is a copy from a painted design.

In the canvas against an impressive background of mountains, whose snows and glaciers are tinted with blues and purples and greens, a Chilkat blanket hangs in process of making, and around it is grouped the family engaged in the work. The man stands passively at the left. Carved emblems on the uprights of the looms, also the painted pattern board at the right of the composition, are his share in the work. The old woman seated at the right with lower lip distended by a mouth ornament indicative of her wealth and rank, is engaged in spinning a strand of the wool from the mountain goat.

For the weaving of a Chilkat blanket all the long coarse outer hair of the goat is discarded, since only the soft fine under wool is used. The wool is

spun by hand, and then dyed in the yarn. To prevent the hanging warp from tangling, it is divided and tied in bags of skin as indicated in the painting. The weaving is a marvel of patient execution with the unaided hand, in technique similar to one type of the basketry work of this tribe. The small color fields are woven separately and very ingeniously united by interweaving. Several of these small interwoven fields form divisions which are united with fine sinews, as thread is used by the European tapestry weavers. Technically the Chilkat blanket is a tapestry.

THE SECOND PAINTING

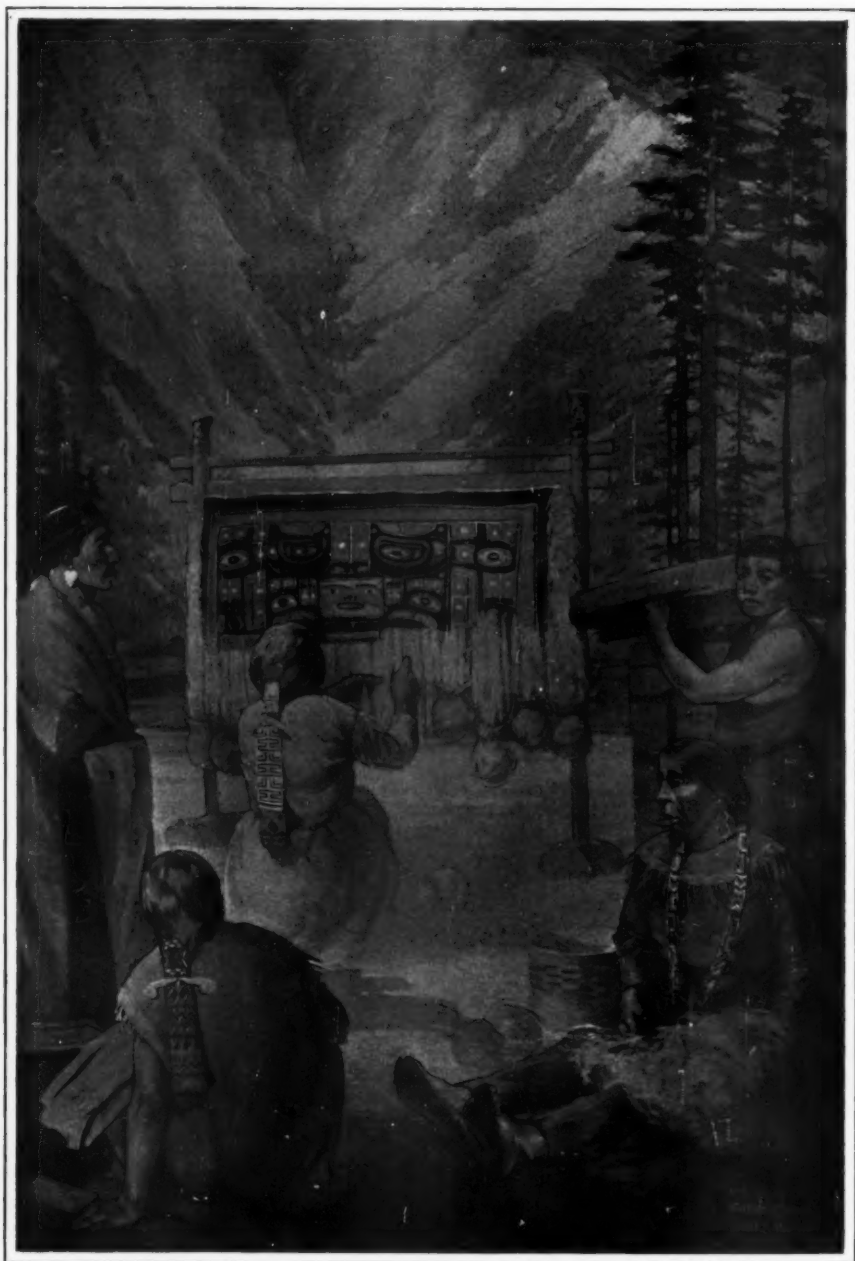
The Canoe Builders

The mural decoration on the west wall, next to that of the Tlingit, portrays the Haida Indians as woodworkers. They are engaged in canoe building just in front of a wooden structure which extends from the right of the composition. This structure is an example of the community house of these people. The timber is hand-hewn and skillfully joined. The boards of the walls are bevelled to slide in a groove and close up to one another with great nicety. Those important structural features, the corner posts and totem poles, the placing of which is the initial step of the building and the occasion of important ceremonies, are broadly indicated as befits their position in the composition.

The North Pacific Coast Indians are a fishing people. Their homes are largely among islands and Mr. Taylor could have chosen no better object illustrative of their lives than the canoe. It is their chief means of transportation and in it much of their lives is spent. The red cedars of Queen Charlotte's Islands produce logs from which are made huge canoes, sometimes from forty-five to sixty feet in length. The Haida are master craftsmen since there is no other type of dugout canoe so light, graceful and seaworthy as this one they construct.

In Haida canoe building, the outside contour is first hewn and carved. Wooden pins are driven through the outer surface to indicate the varying thickness of the walls of the canoe, and the interior is dug out to the depths thus fixed. The spread of the beam is attained by steaming the wood. The canoe is partly filled with water into which red hot stones are dropped producing steam which softens the wood. The sides are forced out by wedges which are afterward replaced by permanent seats. Beds of hot embers are kept near the canoes to dry the outer surface.

Not only is the Haida process of canoe building well suggested in this second painting, but also we get in this decoration the atmosphere of the



Mural panel by Will S. Taylor

WEAVING A CHILKAT BLANKET AT A CAMP ON A SALMON RIVER

The blanket is being made for the man of the family who stands at the left. The young girl has stopped in the process of separating the strands of the cedar bark to be used for warp. The woman at the right has looked up from her work of spinning the wool

region, a sense of the mists and the dampness. The attention centers on the boat builder, who is about to drop from long wooden tongs a red hot stone into the water within the canoe from which rises swirling steam, while the glow from the ember fire illumines his well-developed figure and reveals an intensely interested face. The cloud of steam gives life and movement and plays a strong part in the pictorial composition and color scheme, while the diffusing mist veils subordinate detail and holds all in harmonious relation.

THE THIRD PAINTING

The Butter Makers

In this delightful composition, which Mr. Taylor calls "The Butter Makers," we find the *culachon* industry illustrated with much detail. This group of busy Tsimshian is placed in a semi-realistic landscape of great beauty. We discern the flanks of mountains veiled by cloud masses, and the green slopes that reach down to the shore of the Nasse River. The stream is splendid at this point near its mouth where the candlefish come in from the sea. The *culachon* or candlefish are caught during March and April in great numbers with dip nets and rakes or with seines.

This party in the picture has made a temporary camp here in the "lean-to" at the left, to harvest the run. Two methods of preservation are indicated. At the right a man is hanging *culachon* to dry. The other and more important process is the extraction of the oil, which is a greatly valued delicacy used like butter by these people. This oil and the dried *culachon* are exchanged up and down the coast by those Indians so fortunate as to control the catch.

To extract the oil, the fish are permitted to decompose slightly, after which they are placed in boxes of water and kept at the boiling point by the use of red hot stones. The oil is then skimmed off as it rises to the surface, and so precious is it that even the residue is worked over.

The column of light smoke at the left of the painting and the glow of the ember fire indicate the heating of the stones. The woman with the tongs is about to take one of these stones to keep the water boiling in the boxes, and the old woman at the box with the straining mesh is working over the residue.

These quite literal facts are expressed simply while the balance of the composition in line and color mass is well maintained. The artist has invested the whole decoration with poetic charm and the treatment of the clouds, smoke and steam is masterly.

THE FOURTH PAINTING

The Bread Makers of the Bella Coola

This scene is in the beautiful Bella Coola valley, about eighty miles up the fiord at the delta of the river. The narrow valley lies between mountains covered in places with perpetual snow and glaciers.

The purple of the mountains with the delicate greens of cottonwoods ranged along the river's edge, are portrayed in the upper planes of the painting. In the lower plane, beside the winding glacial stream, are swamp lands where skunk cabbage is abundant and hemlocks grow. At the left of the composition the man supported high on the tree trunk is scraping away the inner bark or cambium and dropping the moist strips to the cedar mat held below by the woman and the boys.

The edible value of the cambium is well understood by Indians; that of the pine, spruce and fir is eaten in the spring time, while that of the yellow pine, hemlock and red alder is preserved for winter use. A hole in the ground is lined with hot stones, which are covered with the leaves of the skunk cabbage to keep the bark from burning. Within this the mucilaginous strips are packed and covered with the skunk cabbage leaves, then over all are placed layers of bark and cedar mats. In four days the cambium steamed to a pulp is ground with a pestle on a flat stone, then formed into brick-like cakes and dried in the sun.

This fourth painting has especial distinction because of the sense of space conveyed and of the highly picturesque character of the landscape. The simplicity of the grouping of the figures and the admirable arrangement of the masses of light and dark coloring complete a composition which cannot fail to have lasting charm.

Both the Museum and the artist are to be congratulated. Not every painter would have striven with such sincerity to tell the simple stories of the handicrafts of these various tribes. The color scheme holds together in these four canvases as well as it would in a suite of old tapestries. There is self-restraint and subordination of detail; and there is good measure of the literal and the educational. Art has prevailed over all. Mountain mists and steam-clouds are gracious mediums for invoking the ideal; and yet these are good portraits of the lands where live the Tlingit and the Haida, the Tsimshian, and the Bella Coola.



From mural panel by Will S. Taylor

A BELLA COOLA FAMILY MAKING "BREAD"

The man is gathering hemlock bark, which is later steamed in holes in the ground lined with hot stones; thus is made a kind of native bread

In each canvas the figures are good type portraits of the tribe represented



SUPERNATURAL THUNDERBIRD CHARMS OF THE GAME ON THE MAT AT THE LEFT



THE PRIZES, CONSISTING OF BLANKETS AND STRIPS OF CALICO



THE MENOMINI GAME OF LACROSSE

By Alanson Skinner

Photographs by the Author

THE Menomini Indians, about fifteen hundred in number, are intelligent and progressive farmers dwelling for the most part in substantial log cabins and frame houses on their reservation in northern Wisconsin, yet about one half of them adhere to their ancient ceremonials and to the legends of their race. One of my early experiences after reaching the reservation in the summer of 1910¹ was attendance upon a ceremonial to the Thunderers, given to appease the wrath of these Indian gods of the storm, so that there might end the drought from which the country was suffering; and another consisted in witnessing a ceremonial game of lacrosse, which is interwoven with the legend of the Thunderers and revolves about the idea of the birth of these spirits in man.



THE GAME STARTS

At the lacrosse game the Menomini nation was well represented. The smooth field stretched before us. The prizes, blankets and strips of calico, were hung at one side. Warriors rapidly gathered as the chief moved toward the place where the prizes were displayed. They gathered in a

¹ The gratitude of the Museum goes to the Wisconsin friends who contributed to the success of this expedition of 1910. Those to whom greatest indebtedness is due are Special Agent of the United States Government, Mr. Angus Nicholson, and all his staff, as well as the late agent, Mr. Wilson. As for the Indians, those to whom thanks should be given are very many. Perhaps the ones who have been most liberal and helpful are Mr. John V. Batterlee, Chiefs Perrote, Wiuskacit and Niopet, Messrs. James Blackcloud and Antoine Shilbicow, and Jane Shilbicow and Mrs. Petwaskun.

dense mass about him while he entered upon a speech advising how to play the game to the satisfaction of the Thunderers. As soon as this ended attendants passed among the warriors and collected the game sticks and bringing them to one spot mixed them well together, afterward quickly spreading them out in two opposing rows on the grass. The players followed watching, each making an effort to locate his own stick in one row or the other. When he had done so he knew on which side he was to play and also, for by that time each warrior was standing before his own stick, just who were to play with him, who against. The warriors of one side marked the left cheek with a heavy stroke of vermilion for recognition in the game. Each took up his stick and all seemed ready and waiting for some signal. Suddenly a ball was tossed into the center of the crowd and with many whoops and a great rush the game was on.

The following is the story connected with lacrosse as gained through the interpreter from one of the oldest Indians of the tribe. Knowledge of the legend makes clear many things about the game, such as the honored position near the prizes accorded to the supernatural war club and lacrosse stick belonging to the Indian giving the game.

You ask who are the Thunderbirds. I will tell you. You have seen the black clouds roll up in the spring. You have seen the rain fall heavily and you have seen the great flashes of light that shoot from the heavens, and you have heard the rumbling noise that follows. What the Wabskuat (Paleface) says of these things I do not know, but the Indian understands well that they are made by the Thunderbirds hunting.

Far, far away in the West where the sun sets, there floats a great mountain in the sky. Above the earth the rocks lie tier on tier. These cliffs are too lofty to be reached by any earthly bird. Even the great war eagle cannot soar so high. But on the summit of this mountain dwell the Thunderbirds. They have control over the rain and the hail. They are messengers of the Great Sun himself, and their influence induced the Sun and the Morning Star to give the great war-bundle to our race. They delight in fighting and great deeds. They are the mighty enemies of the horned snakes, the Misikinubik. Were it not for the Thunderers these monsters would overwhelm the earth and devour mankind. When the weather is fair, then watch when you travel abroad, for the snakes come out to bask in the sun, but when the weather is cloudy you need fear nothing, for the Thunderers come searching from behind the clouds for their enemies, the Misikinubik.

Now this is true and our people know it well, that these Thunderers have a great love for us. Often they come down to earth and are born as men. He who bears a Thunderer's spirit has power to understand nature and to foretell the weather and he is strong in war. But a man who has such a spirit is not like other Indians. As a child his parents never punish him for fear his spirit will be shamed and leave his body. Instead they honor him and make for him a war club and lacrosse stick, the one to protect him in time of war, the other a symbol that he is a child of the Thunderers. For lacrosse is a warlike game and therefore the Thunderbirds delight in it. Anyone who has a Thunderer's spirit in him must have the game played at least once a year. He must offer great prizes to the winner of his game and he must



THE CHIEF INSTRUCTS THE PLAYERS

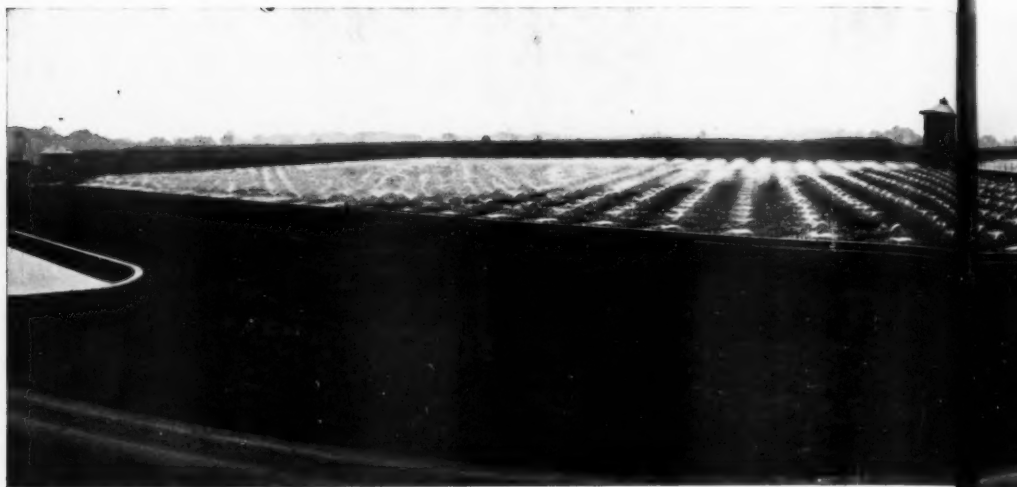
send out gifts of tobacco to all the people as an invitation to come and play. He himself takes no part but sits and watches and the Thunderers are satisfied.

Before I left the reservation I saw three additional ceremonial lacrosse games, besides other interesting ceremonies such as that of the Society of Dancing Men. Ceremonies of all kinds among the Menomini are becoming more and more curtailed every year and adherence to legendary lore more rare, and it is probably a question of only a few years more when all will have passed into tradition.

The Menomini Indians have always been exceedingly friendly toward the white man and they were well pleased when they learned that a systematic effort was to be made by the American Museum to record their old life and collect their ancient articles. In the words of Chief Niopet, who presented the Museum with several handsome examples of beadwork, the following is their idea: "We wish to put these things into the 'great house' where they will be kept with care, where our children's children may go to see them when our race has followed the white man's road until it has forgotten their use."



A SCRIMMAGE NEAR THE GOAL. THE FIRST SIDE SCORING FOUR GOALS WINS



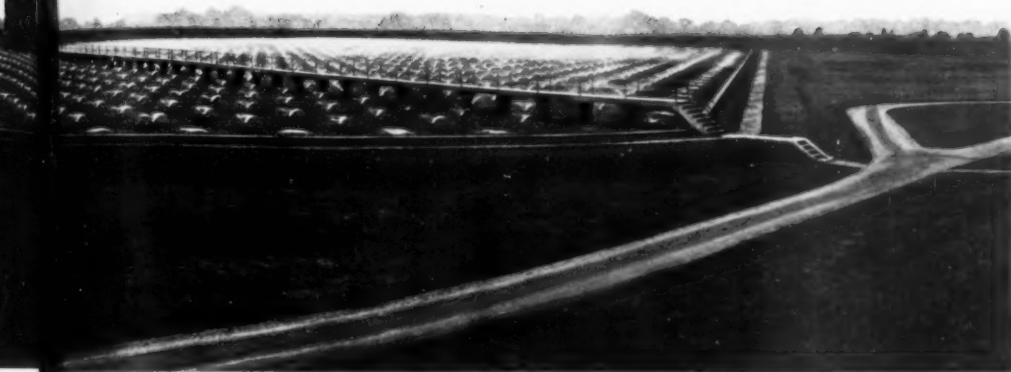
A QUESTION OF PUBLIC HEALTH

EXHIBIT OF MODELS ILLUSTRATING POLLUTION OF NEW YORK HARBOR
WATERS AND SCIENTIFIC METHODS FOR THE DISPOSAL OF CITY SEWAGE

By C-E. A. Winslow

CITY life presents pressing and peculiar biological problems. When a great number of human beings are concentrated within a small area, the fundamental needs of individual life must be met by the latest perfected methods. Especially should this hold true in the prevention of epidemics, which always threaten crowded communities; and in guarding against disease the first essential is the proper removal of the waste products which accompany all living processes. One of the greatest problems which confronts a modern municipality is here encountered, for from every large city there pours out a river of waste material which pollutes streams, harbors and foreshores, spoiling what should be the pleasure-spots of the city, damaging property and even endangering health and life.

New York is more fortunate than most cities in the large bodies of water which wash its shores, but to-day the disposal of its waste material has become a serious problem and one which demands prompt solution. The Metropolitan Sewerage Commission which has recently published the results of its important investigations will shortly make an exhibit of its work at the American Museum, and the Museum's Department of Public Health has prepared a series of models illustrating on the one hand local conditions



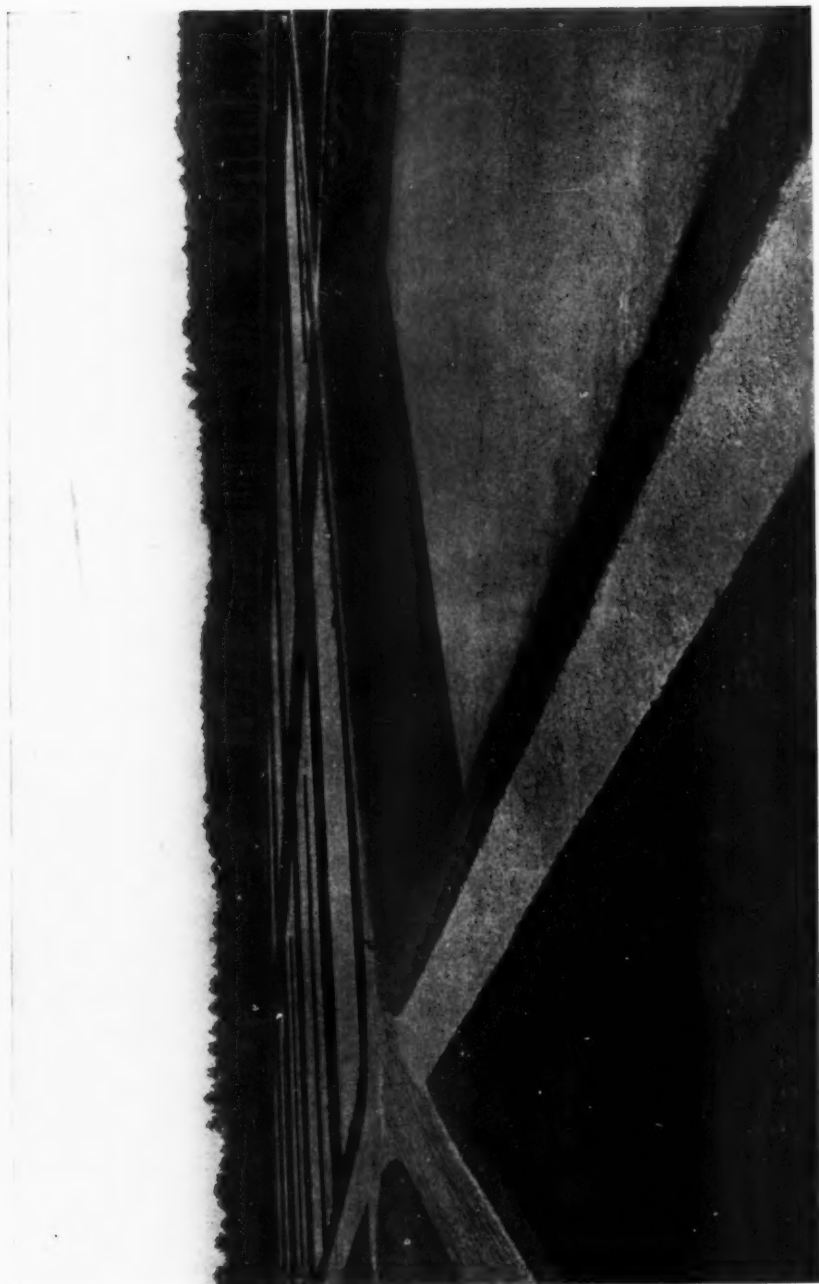
PANORAMIC VIEW OF TRICKLING FILTERS, COLUMBUS, OHIO

The most efficient device yet discovered for the purification of a city's sewage — stones on which bacterial growth may gather and a regulated supply of sewage in fine spray and of air

with regard to harbor waters and on the other hand the various devices which may be used for the disposal of city sewage by sanitary methods.

When sewage is discharged in small volume into a relatively large body of water the aim of all sewage purification is attained. The bacteria normally present in the water attack the organic matter and oxidize it, and at the same time the typical sewage bacteria, finding themselves in an unfavorable environment, gradually die and disappear. In New York, however, the present method of disposal by the haphazard discharge of sewers into the waters of the rivers and harbor at the piers or bulkhead lines, is manifestly unsatisfactory. The sewage oscillates back and forth instead of passing promptly out to sea, and the local nuisances at certain points are extreme.

Besides the fact that this brings about conditions offensive to the senses, real danger to health is involved. The germs of typhoid and other infectious diseases are always present in a city's waste, menacing the lives of those to whom their contact is inevitable. For instance all along the waterfront, driftwood and other floating objects are picked out by the poor and carried to their homes. In Jamaica Bay and neighboring waters shellfish are grown in close proximity to both public and private sewers and while some processes of cookery destroy the typhoid germs, others do not. The greatest risk is run by bathing in the polluted waters and in New York several of the free floating baths maintained by the city are placed sufficiently



Courtesy of G. E. Balling

INTERMITTENT SAND FILTERS, BROCKTON, MASSACHUSETTS

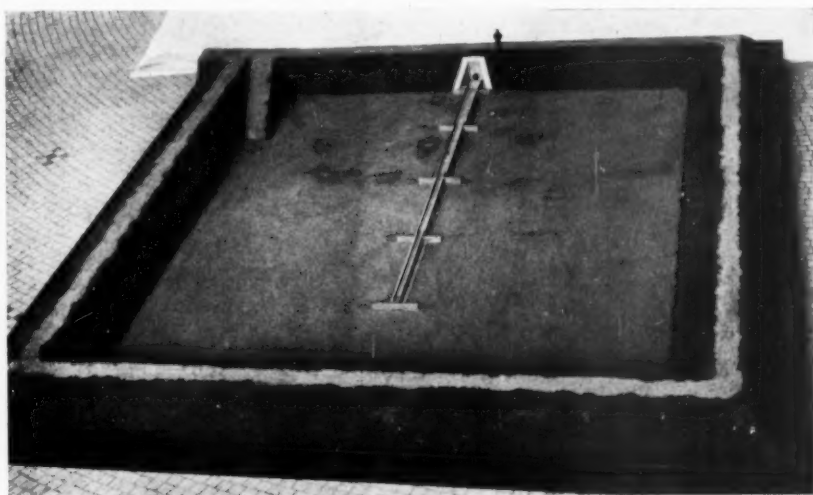
The new problem in the disposal of city sewage is solved by screening. This must usually be followed by some process of sedimentation

near sewer outlets to furnish excellent opportunity for infection of various sorts.

The first problem in the disposal of city sewage is the elimination of the coarser floating particles by some form of screening. In some cases this alone is sufficient, but generally sedimentation must also be employed. In sedimentation excellent results have come from the use of a deep tank having a conical or pyramidal bottom. Into the lower part of this tank the sewage enters, spreads out in the conical section as it rises, progressively diminishes in velocity, and when the effluent flows off at the top, leaves the suspended solids behind.

The sludge which accumulates in the sedimentation tank must itself be disposed of in some way and the modified sedimentation basin known as the "septic tank" is designed to minimize this nuisance by holding the sludge under such conditions that it may be liquified by anaërobic bacteria. One tank of this type, the Imhoff tank used extensively in northern Germany, has met with marked success.

After the removal of suspended solids, the liquid sewage remains to be purified. The most primitive method of disposal consists in its distribution over the surface of suitable land, what is called "broad irrigation." Under proper conditions the living earth renders organic matter harmless and changes it into food material for the higher plants. Paris and Berlin to-day utilize this method of disposal. But broad irrigation requires large areas of land of suitable soil and would be a costly method for a city situated as



Intermittent Sand Filter Bed. Photograph of a model in the American Museum

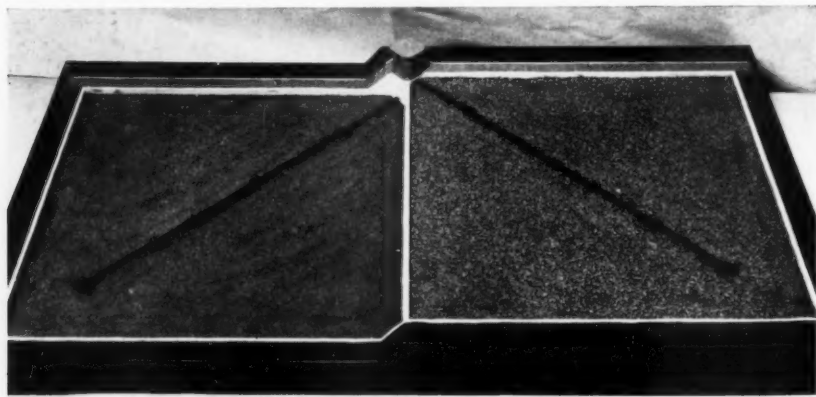


Septic Tank or modified sedimentation basin. Model in the American Museum

is New York, where the waste would have to be carried a great distance before final disposition of it could be made.

At Lawrence, Massachusetts, through the experiments of the Massachusetts Board of Health, a more scientific and intensive modification of the irrigation process was devised known as intermittent filtration. It consists in the application of sewage in regulated quantities to the surface of properly prepared beds of sand in which nitrifying bacteria colonize and oxidize the organic matters in the sewage into harmless mineral form. The construction of this filter is simple in regions like those in the northeastern part of the United States where there is suitable soil from glacial drift.

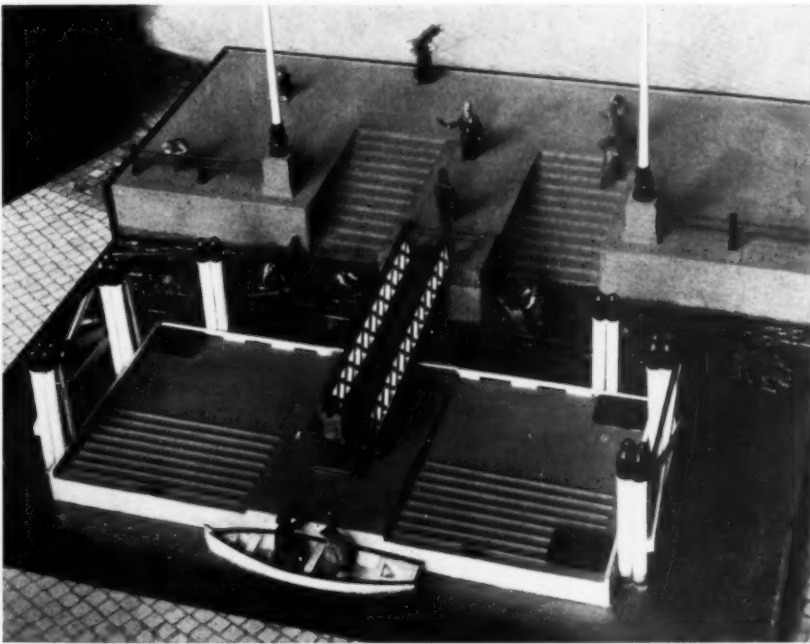
Even the intermittent filter requires a large area of land however, and



Double contact beds for purification of sewage on the plan of "broad irrigation" but without the necessity of large areas of land. Model in the American Museum

still more rapid processes have been devised to meet the needs of communities which have no ample sand areas at their doors. It was shown by a series of English investigators that the nitrifying bacteria could be grown on coarser materials like broken stone as well as on sand and that by filling a bed with such materials and letting sewage stand in it for a short time in contact with the stone, a considerable purification would take place. Such a purifying device is known as a "contact bed."

The most efficient device of all is the "trickling" or "percolating" bed which represents still another method of combining the three required



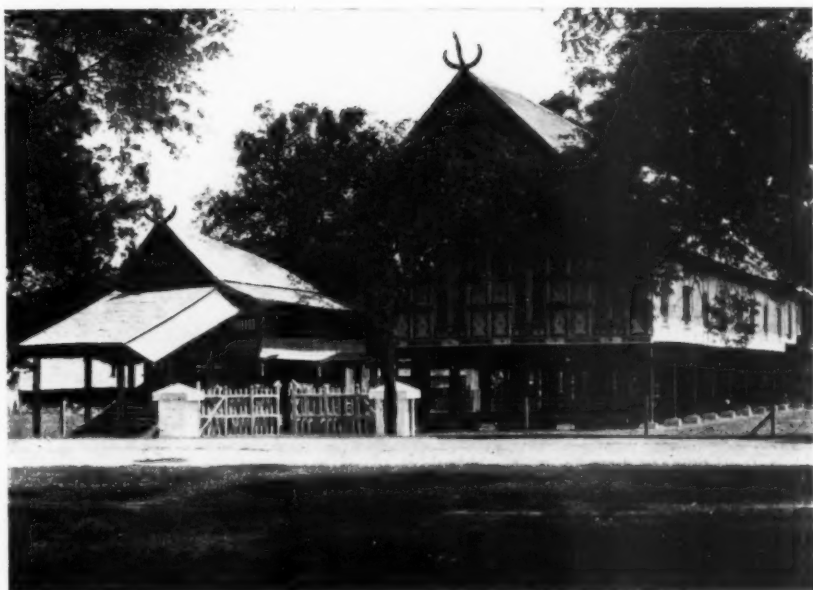
Picking up polluted driftwood on the Battery steps. Model in the American Museum

elements, sewage, bacteria and air. In 1894, at Newport, Rhode Island, the late Colonel George E. Waring experimented with the purifying of sewage at high rates by blowing air into a bed of coarse stone from below, while sewage ran down through it from above. Theoretically good, practically the method fell short of perfection; but success has finally been reached along another similar line by applying sewage, not in bulk, but in a fine spray distributed as evenly as possible over the surface of the bed. By this method the liquid trickles in thin films over the surface of the filling

material while the spaces between are continually filled with air. The trickling bed, which may be defined simply as a heap of stones or other material of such size, depth and texture as to support a bacterial growth sufficient for the work in hand, is considered one of the most promising and effective of any known device for sewage purification and particularly well adapted for use in large cities, for it exhibits the simplicity which distinguishes the best scientific application — a pile of stones on which bacterial growth may gather and a regulated supply of air and sewage being the only desiderata. In this way the dangerous organic waste material produced in the city of human habitations is carried out to the city of microbes on their hills of rocks and it is their duty to turn it into a harmless mineral form.

The removal of disease bacteria is not necessarily accomplished by these newer processes of sewage disposal which are primarily designed to remove putrescible organic matter. This end, which is an important one in a seaboard city because of its adjacent shellfish industries, can be met by special chemical treatment. The application of ordinary bleaching powder or chloride of lime in small amounts of fifteen to thirty parts of powder to a million parts of sewage will effect a satisfactory reduction of bacteria at a very reasonable cost.

There are yet many unsolved problems in the purification and disposal of a city's sewage, yet the work of the last ten years in the United States and England foreshadows ultimate success. To-day the engineer is limited in the perfection of his work only by the amount of money the community is prepared to expend; and the City of New York can go as far along this line as its citizens choose to afford. It should unquestionably go farther than it has gone to-day.



A MODERN MUSEUM OF CELEBES

By Roy C. Andrews

WHEN a naturalist's wanderings in the South Seas carry him to a native city of comparatively small white population, and he finds there a museum embodying modern ideas of exhibition, he experiences considerable surprise. It was my good fortune on Christmas Day of 1909 to find such a museum and also to visit it with its founder and curator, His Excellency Baron Quarles de Quarles, Governor of Celebes.

The Albatross had but recently dropped anchor in the Bay of Makassar. While driving in Makassar, the principal city of South Celebes, we came upon a large, oblong building set on piles and having an entrance-way projecting from the front. As usual the little shaggy brown horse drawing the rickety "carametta" in which we were riding was rushing along at a furious pace and we had almost passed the house before we caught sight of an English sign reading "Museum." The building was closed, but its keeper was finally located and although he spoke only Dutch and Malay, we managed to exchange ideas and made a brief inspection of the place.

Later Captain McCormack and myself visited the Museum, conducted by Baron de Quarles, who presented to the American Museum a small collection representing some of the most characteristic features of the native

life of Celebes. The building was formerly the residence of the deposed Raja of Boni, a potentate who for some time ruled one of the large provinces of the Island, and itself furnishes a most interesting example of the royal dwellings of these native princes.

The collections contained in the museum are strictly local, but represent in a form quite complete the basket work and other industries, the dress and customs, in fact all the principal features of the life of the natives in and about Celebes. All the material has been collected and arranged under the supervision of the Governor. Plaster casts have been prepared to illustrate the natives and the dress of the different tribes. There are also miniature models of fish-traps, houses, and boats, as well as models to show pottery making and basketry. Around the walls are hung spears, knives, shields, and other articles of warfare, and their uses are explained by admirable labels in Malay, Dutch and English. One room contains many objects which made part of the furnishings of the household in the time of the Raja of Boni.

The entire museum gives such evidence of attention to details and of thought and care in selection and exhibition of specimens that it reflects the greatest credit on Baron de Quarles. He has extended the scope of the Makassar Museum's work by making up and presenting to expositions in various countries of Europe collections representing the chief features of the ethnology of the natives of the Celebes. It is to be hoped that there will be a continuance of the growth of this institution which, although the years of its existence have been few, is already doing important educational work, and that the example so admirably set by Baron de Quarles will be followed by the officials of other native cities.

MUSEUM NEWS NOTES

OWING to ill health, Dr. J. A. Allen, Curator of Mammalogy, has given up his duties as Acting Director and the President has appointed Dr. E. O. Hovey, Curator of the Department of Geology and Invertebrate Palæontology to serve as Acting Director pro tem during the absence of Dr. Townsend.

THE Department of Anthropology has recently received the gift of a Sioux tepee made entirely of buffalo skins. This tepee is of peculiar interest from the fact that for at least the past thirty years buffalo skins have not been used in Indian house construction.

MR. FRANK M. CHAPMAN sailed from New York March 14 for Colombia, South America, where he is to join Mr. William B. Richardson, who has been in that locality collecting birds and mammals for the Museum for several months. Mr. Chapman expects to get into a region where no collecting of birds has been done; there he will make a systematic survey, probably obtaining some undescribed species and many new to the Museum collections. He will also get material for several new bird groups. He has taken an assistant and expects to remain until July, when Mr. Richardson and the assistant will continue the work.

DR. GEORGE H. GIRTY of the United States Geological Survey, who has recently presented to the Museum a series of fossil invertebrates, has been made a Life Member of the Museum in recognition of his generosity.

At the meeting of the Executive Committee on March 22, Mr. Frederick H. Smyth was appointed to the position of bursar of the American Museum of Natural History, the appointment to take effect April 1, 1911.

THE METROPOLITAN SEWERAGE COMMISSION in coöperation with the Department of Public Health of the American Museum will hold an exhibition at the Museum during the last two weeks of April. The exhibition will illustrate conditions of sewerage and sewage disposal in the metropolitan district of New York and will include models, charts, diagrams and apparatus used by the Commission in its investigations.

THE HALL OF MOLLUSCS which has been removed from the fifth floor to make room for the new administrative offices is still in preparation and will not be open to the public for some time. The shell collections of the Museum, which are among the earliest of its acquisitions, are being rearranged in accordance with the modern spirit of museum exhibition.

PUBLIC meetings of the New York Academy of Sciences and its Affiliated Societies will be held at the Museum according to the usual schedule. Programmes of meetings are published in the weekly *Bulletin* of the Academy.

LECTURE ANNOUNCEMENTS

PUPILS' COURSE

These lectures are open to the pupils of the public schools when accompanied by their teachers and to children of Members of the Museum on presentation of Membership tickets. Mondays, Wednesdays and Fridays at 4 o'clock.

- March 20 and April 17 — MR. ROY W. MINER, "Early Days in New York."
March 22 and April 19 — MR. ROY C. ANDREWS, "A Visit to the Orient."
March 24 and April 21 — DR. LOUIS HUSSAKOF, "Scenes from Pole to Pole."
March 27 and April 24 — MR. JOHN T. NICHOLS, "Natural Resources of the United States."
March 29 and April 26 — MR. WALTER GRANGER, "Famous Rivers of the World."
March 31 and April 28 — MR. HARLAN I. SMITH, "Life among Our Indians."
April 3 and May 1 — MR. ROY C. ANDREWS, "Travels and Life among the Japanese."
April 5 and May 3 — DR. LOUIS HUSSAKOF, "South American Scenes."
April 21 and May 5 — MRS. AGNES L. ROESLER, "Around the World with Children."

PEOPLE'S COURSE

Given in coöperation with the City Department of Education

Tuesday evenings at 8:15 o'clock. Doors open at 7:30.

The last four of a series of lectures on "Great Modern Composers" by DANIEL GREGORY MASON. Illustrated at the piano.

- April 4 — "Peter Ilyitch Tchaikovsky."
April 11 — "Johannes Brahms."
April 18 — "Richard Strauss."
April 25 — "Present-day Tendencies."

Saturday evenings at 8:15 o'clock. Doors open at 7:30.

- April 1 — MR. ALBERT HALE, "Central America: Costa Rica, Nicaragua, Honduras, Salvador and Guatemala." Illustrated.
April 8 — MR. ALBERT HALE, "Mexico: Our Nearest Neighbor." Illustrated.
April 15 — MR. CHARLES R. TOOTHAKER, "Panama and the Canal." Illustrated.
April 22 — Subject and lecturer to be announced.
April 29 — PROF. WILLIAM LIBBEY, "Hawaii." Illustrated.